400 SARATOGA AVENUE NOISE AND VIBRATION ASSESSMENT

Santa Clara, California

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INTRODUCTION

A five-story apartment building, a maintenance facility, and a public park are planned at 400 Saratoga Avenue in the City of Santa Clara, California. The project would redevelop approximately 5.4-acres on the south side of the approximate 31-acre Pruneridge Golf Club property, along Pruneridge Avenue between San Tomas Expressway and Saratoga Avenue. The site is currently developed with a golf course and maintenance building, which would be demolished as part of the proposed project. The existing portion of the golf course would be reconfigured, but the driving range on the north side of the project will not be changed. The apartment building would contain 316 residential units, a 9,950 square foot centrally located outdoor courtyard, and a 1,400 square foot fifth-floor roof deck area. A seven-story parking structure would be included within the apartment building, and small surface parking lots will be constructed for the maintenance facility and the public park. A one-story, 2,460 square foot maintenance building is planned near the east side of the apartment building. A 1.77-acre public park is planned for the southeast section of the project site, near the intersection of Pruneridge Avenue and Saratoga Avenue.

This report evaluates the project's potential to result in significant noise and vibration impacts with respect to applicable California Environmental Quality Act (CEQA) guidelines. The report is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory background, and describes the existing ambient noise environment at the project site; 2) the Plan Consistency Analysis Section discusses noise and land use compatibility utilizing applicable regulatory background; and, 3) the Impacts and Mitigation Measures Section describes the significance criteria used to evaluate project impacts, provides a discussion of each project impact, and presents measures, where necessary, to mitigate the impacts of the project on sensitive receptors in the vicinity.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more

intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA).* This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level* (*CNEL*) is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level* (L_{dn} or *DNL*) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 p.m.to 10:00 p.m. and after addition of 10 decibels to sound levels measured in the night between 10:00 p.m. and 7:00 a.m.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed; those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn}. At a L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a L_{dn} of 60 to 70 dBA. Between a L_{dn} of 70 to 80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe – Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

Regulatory Background – Noise

The State of California and the City of Santa Clara have established noise criteria, and the California Department of Transportation (Caltrans) have established vibration criteria that are applicable in this assessment. The State of California Environmental Quality Act (CEQA) Guidelines, Appendix G, are used to assess the potential significance of impacts pursuant to local General Plan policies, Municipal Code standards, or the applicable standards of other agencies. A summary of the applicable regulatory criteria is provided below.

Federal

Federal Transit Administration. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,[1] which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, to 85 dBA L_{eq} at commercial and office uses, and to 90 dBA L_{eq} at industrial land uses.

State of California

State CEQA Guidelines. CEQA contains guidelines to evaluate the significance of effects of environmental noise attributable to a proposed project. Under CEQA, noise impacts would be considered significant if the project would result in:

[1] Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels; or

(c) For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

2022 California Building Code, Title 24, Part 2. The current version of the California Building Code (CBC) requires interior noise levels in multi-family residential units attributable to exterior environmental noise sources to be limited to a level not exceeding 45 dBA L_{dn}/CNEL in any habitable room.

Santa Clara County

Santa Clara County Airport Land Use Commission Comprehensive Land Use Plan. The Comprehensive Land Use Plan (CLUP) adopted by the Santa Clara County Airport Land Use Commission contains standards for projects within the vicinity of San José International Airport which are relevant to this project:

4.3.2.1 Noise Compatibility Policies

N-1 The Community Noise Equivalent Level (CNEL) method of representing noise levels shall be used to determine if a specific land use is consistent with the CLUP.

N-2 In addition to the other policies herein, the Noise Compatibility Policies presented in Table 4-1 shall be used to determine if a specific land use is consistent with this CLUP.

N-3 Noise impacts shall be evaluated according to the Aircraft Noise Contours presented on Figure 5 (not shown in this report).

N-4 No residential construction shall be permitted within the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound levels will be less than 45 dB CNEL and there are no outdoor patios or outdoor activity areas associated with the residential project. All property owners within the 65 dB CNEL contour boundary who rent or lease their property for residential use shall include in their rental/lease agreement with the tenant, a statement advising that they (the tenants) are living within a high noise area and the exterior noise level is predicted to be greater than 65 dB CNEL.

N-5 Residential construction will not be permitted in the area between the 60 dB CNEL contour boundary and the 65 dB CNEL contour boundary unless it can be demonstrated that the resulting interior sound level will be no greater than 45 dB CNEL.

N-6 Noise level compatibility standards for other types of land uses shall be applied in the same manner as the above residential noise level criteria. Table 4-1 presents acceptable noise levels for other land uses in the vicinity of the Airport.

Table 4 - 1

NOISE COMPATIBILITY POLICIES

LAND USE CATEGORY	CNEL					
	55-60	60-65	65-70	70-75	75-80	80-85
Residential – low density Single-family, duplex, mobile homes	*	**	***	****	****	****
Residential – multi-family, condominiums, townhouses	*	**	***	****	****	****
Transient lodging - motels, hotels	*	*	**	****	****	****
Schools, libraries, indoor religious assemblies, hospitals, nursing homes	*	***	****	****	****	****
Auditoriums, concert halls, amphitheaters	*	***	***	****	****	****
Sports arena, outdoor spectator sports, parking	*	*	*	**	***	****
Playgrounds, neighborhood parks	*	*	***	****	****	****
Golf courses, riding stables, water recreation, cemeteries	*	*	*	**	***	****
Office buildings, business commercial and professional, retail	*	*	**	***	****	****
Industrial, manufacturing, utilities, agriculture	*	*	*	***	***	****
* Generally Acceptable	Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements. Mobile homes may not be acceptable in these areas. Some outdoor activities might be adversely affected.					
** Conditionally Acceptable	New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Outdoor activities may be adversely affected. Residential: Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.					
*** Generally Unacceptable	New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Outdoor activities are likely to be adversely affected.					
**** Unacceptable	New construction or development shall not be undertaken.					

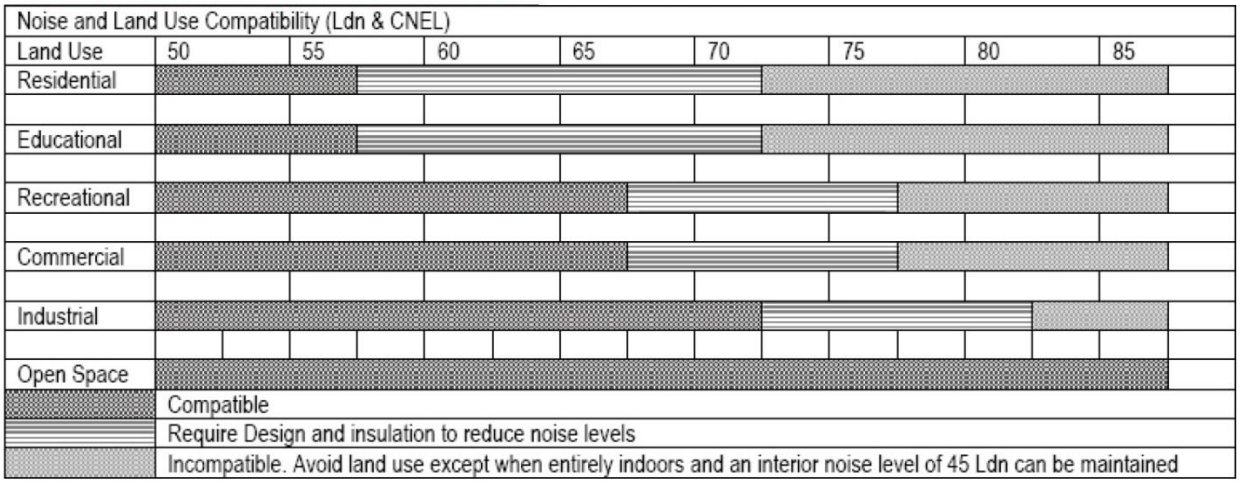
Source: Based on General Plan Guidelines, Appendix C (2003), Figure 2 and Santa Clara County ALUC 1992 Land Use Plan, Table 1

Source: Comprehensive Land Use Plan Santa Clara County, Norman Y Mineta San José International Airport, May 25, 2011, Amended May 23, 2019.

City of Santa Clara

City of Santa Clara General Plan. The City of Santa Clara's General Plan identifies noise and land use compatibility standards for various land uses and establishes policies to control noise within the community. Table 5.10-2 from the General Plan shows acceptable noise levels for various land uses. Residential land uses are considered compatible in noise environments of 55 dBA L_{dn}/CNEL or less. The guidelines state that where the exterior noise levels are greater than 55 dBA L_{dn}/CNEL and less than 70 dBA L_{dn}/CNEL, the design of the project should include measures to reduce noise levels to acceptable levels. Noise levels exceeding 70 dBA L_{dn}/CNEL at residential land uses are considered incompatible.

TABLE 5.10-2: GENERAL PLAN NOISE STANDARDS



Applicable goals and policies presented in the General Plan are as follows:

5.10.6-G1 Noise sources restricted to minimize impacts in the community.

5.10.6-G2 Sensitive uses protected from noise intrusion.

5.10.6-G3 Land use, development and design approvals that take noise levels into consideration.

5.10.6-P1 Review all land use and development proposals for consistency with the General Plan compatibility standards and acceptable noise exposure levels defined on Table 5.10-1.

5.10.6-P2 Incorporate noise attenuation measures for all projects that have noise exposure levels greater than General Plan "normally acceptable" levels, as defined on Table 5.10-1.

5.10.6-P3 New development should include noise control techniques to reduce noise to acceptable levels, including site layout (setbacks, separation and shielding), building treatments (mechanical ventilation system, sound-rated windows, solid core doors and baffling) and structural measures (earthen berms and sound walls).

5.10.6-P4 Encourage the control of noise at the source through site design, building design, landscaping, hours of operation and other techniques.

5.10.6-P5 Require noise-generating uses near residential neighborhoods to include solid walls and heavy landscaping along common property lines, and to place compressors and mechanical equipment in sound-proof enclosures.

5.10.6-P6 Discourage noise sensitive uses, such as residences, hospitals, schools, libraries and rest homes, from areas with high noise levels, and discourage high noise generating uses from areas adjacent to sensitive uses.

5.10.6-P7 Implement measures to reduce interior noise levels and restrict outdoor activities in areas subject to aircraft noise in order to make Office/Research and Development uses compatible with the Norman Y. Mineta International Airport land use restrictions.

City of Santa Clara Municipal Code. The City's Municipal Code establishes noise level performance standards for fixed sources of noise. Section 9.10.40 of the Municipal Code limits noise levels at receiving single- and multi-family residences to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and 50 dBA at night (10:00 p.m. to 7:00 a.m.); at receiving commercial and office buildings to 65 dBA during daytime hours and 60 dBA at night; and at receiving light industrial uses to 70 dBA anytime. The noise limits are not applicable to emergency work, licensed outdoor events, City-owned electric, water, and sewer utility system facilities, construction activities occurring within allowable hours, permitted fireworks displays, or permitted heliports.

Construction activities are not permitted within 300 feet of residentially zoned property except within the hours of 7:00 a.m. and 6:00 p.m. on weekdays and 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

The City Code does not define the acoustical time descriptor such as L_{eq} (the average noise level) or L_{max} (the maximum instantaneous noise level) that is associated with the above limits. A reasonable interpretation of the City Code would identify the ambient base noise level criteria as an average or median noise level (L_{eq}/L_{50}).

Regulatory Background – Vibration

California Department of Transportation. The California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, which typically consist of buildings constructed since the 1990s. Conservative vibration limits of 0.3 in/sec PPV is used for buildings that are found to be structurally sound but where structural damage is a major concern (see Table 3 above for further explanation). For historical buildings or some older buildings, a vibration limit of 0.25 in/sec PPV would apply.

Existing Noise Environment

The project site is an existing golf course and is bound by Saratoga Avenue to the east, Pruneridge Avenue to the south, San Tomas Expressway to the west, and the remaining portion of the golf course and driving range to the north. The area is a mix of residential, commercial, and recreational land uses. The noise environment at the site and in the surrounding areas results primarily from vehicular traffic along Saratoga Avenue, Pruneridge Avenue, and San Tomas Expressway. Aircraft associated with San José Mineta International Airport also contributes to the noise environment.

A noise monitoring survey, which included two long-term and five short-term noise measurements, was performed at the site beginning on Tuesday May 28, 2024 and concluding on Thursday May 30, 2024. All measurement locations are shown in Figure 1.

Long-term noise measurement LT-1 was made approximately 100 feet east of the centerline of San Tomas Expressway, near the western boundary of the site. This location was chosen to represent noise levels at the west façade of the proposed apartment building. Hourly average noise levels at LT-1 typically ranged from 68 to 74 dBA L_{eq} during the day and from 58 to 72 dBA L_{eq} at night. The Community Noise Equivalent Level (CNEL) for the 24-hour period occurring on Wednesday May 29, 2024 was 74 dBA. The daily trends in noise levels at LT-1 are shown in Figures A1 through A3 in the Appendix of this report.

Long-term noise measurement LT-2 was made approximately 140 feet west of the centerline of Saratoga Avenue, near the eastern boundary of the site. This location was chosen to represent noise levels at the proposed public park area. Hourly average noise levels at LT-2 typically ranged from 56 to 64 dBA L_{eq} during the day and from 48 to 61 dBA L_{eq} at night. The noise exposure for the 24-hour period occurring on Wednesday May 29, 2024 was 63 dBA CNEL. The daily trends in noise levels at LT-2 are shown in Figures A4 through A6 in the Appendix of this report.

Five short-term noise measurements were made on Tuesday May 28, 2024 in 10-minute intervals between 11:20 a.m. and 12:50 p.m. ST-1 was made near the east side of the proposed apartment building, approximately 320 feet east the centerline of San Tomas Expressway and approximately 300 feet north of the centerline of Pruneridge Avenue. During the measurement, traffic along San Tomas Expressway generated noise levels ranging from 41 to 61 dBA. Background traffic noise from Pruneridge Avenue also contributed to the noise environment. The 10-minute average noise level at ST-1 was 54 dBA L_{eq}.

ST-2 was made near the southwest corner of the proposed apartment building, approximately 120 feet east the centerline of San Tomas Expressway and approximately 85 feet north of the centerline of Pruneridge Avenue. During the measurement, traffic along San Tomas Expressway and Pruneridge Avenue generated noise levels ranging from 49 to 77 dBA. The 10-minute average noise level at ST-2 was 64 dBA L_{eq}.

ST-3 was made near the proposed south façade of the apartment building, approximately 65 feet north of the centerline of Pruneridge Avenue. During the measurement, traffic along Pruneridge

FIGURE 1 Noise Measurement Locations



Source: Google Earth, 2025.

Avenue generated noise levels ranging from 53 to 71 dBA. Background traffic noise from San Tomas Expressway also contributed to the noise environment. The 10-minute average noise level at ST-3 was 61 dBA L_{eq}.

ST-4 was made near the center of the site, approximately 195 feet north of the centerline of Pruneridge Avenue. During the measurement, traffic along Pruneridge Avenue generated noise levels ranging from 48 to 55 dBA. Background traffic noise from San Tomas Expressway and Saratoga Avenue also contributed to the noise environment. An airplane generated noise levels up to 54 dBA. The 10-minute average noise level at ST-4 was 52 dBA L_{eq}.

ST-5 was made near the southeast corner of the site, approximately 105 feet north of the centerline of Pruneridge Avenue and approximately 110 feet west of the centerline of Saratoga Avenue. During the measurement, traffic along Pruneridge Avenue and Saratoga Avenue generated noise levels ranging from 53 to 73 dBA. The 10-minute average noise level at ST-5 was 60 dBA L_{eq}. Table 4 summarizes the metrics measured at all five short-term measurements.

TABLE 4 Summary of Short-Term Noise Measurement Data (dBA)

Noise Measurement Location	Date, Time	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	10-min L_{eq}
ST-1: ~320 feet from the centerline of San Tomas Expressway	5/28/2024, 11:20-11:30 a.m.	61	60	59	51	46	54
ST-2: ~120 feet from the centerline of San Tomas Expressway	5/28/2024, 11:40-11:50 a.m.	77	72	68	61	55	64
ST-3: ~65 feet from the centerline of Pruneridge Avenue	5/28/2024, 12:00-12:10 p.m.	71	68	65	58	50	61
ST-4: ~195 feet from the centerline of Pruneridge Avenue	5/28/2024, 12:20-12:30 p.m.	58	56	54	52	49	52
ST-5: ~105 feet from the centerline of Pruneridge Avenue	5/28/2024, 12:40-12:50 p.m.	73	69	63	58	53	60

PLAN CONSISTENCY ANALYSIS

Noise and Land Use Compatibility

Noise levels in outdoor use areas that are affected by transportation noise are required to be maintained at or below 55 dBA CNEL to be considered normally acceptable for residential land uses, according to the City's General Plan. Additionally, residential interior noise levels are required to meet the performance standard of 45 dBA CNEL.

The existing noise environment measured during the noise survey showed noise levels of 57 dBA CNEL on the north boundary of the site near the golf course driving range, 64 dBA CNEL along the south boundary along Pruneridge Avenue, 66 dBA CNEL on the east boundary along Saratoga Avenue, and 74 dBA CNEL on the west boundary, along San Tomas Expressway. The noise level at the center of the proposed public park is calculated to be approximately 60 dBA CNEL.

The future noise environment at the project site would continue to result from traffic along Pruneridge Avenue, Sam Tomas Expressway, and Saratoga Avenue. A traffic study completed for the proposed project states that the project is estimated to generate 106 vehicle trips during the AM peak hour, 127 trips during the PM peak hour, and a total of 1,362 daily vehicle trips. When comparing the existing traffic volumes with the cumulative plus project traffic volumes, noise levels at the project site and vicinity are calculated to increase by less than 1 dBA CNEL in the future.

Future Exterior Noise Environment

The residential building will include a centrally located ground floor outdoor courtyard that will be shielded from traffic noise, and a 5th floor outdoor dining area on the east side of the building. A public park will be located on the east side of the building. Considering the shielding provided by the building, the ground floor outdoor courtyard will be exposed to future exterior noise levels of approximately 44 dBA CNEL. The center of the 5th floor outdoor dining area will be exposed to future exterior noise levels less than 50 dBA CNEL. The public park will not be shielded from traffic noise and will be exposed to future exterior noise levels ranging from approximately 57 to 66 dBA CNEL. The center of the public park will be approximately 60 dBA CNEL. The centrally located ground floor outdoor courtyard and 5th floor outdoor dining area would be below the City's 55 dBA CNEL standard. The majority of the public park would be in the Generally Acceptable Land Use Category for neighborhood parks, as defined by the County. Exterior noise thresholds are not enforced at private balconies, porches, or front yard areas.

Future Interior Noise Environment

Standard residential construction provides approximately 15 dBA of exterior-to-interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces. Where exterior noise levels range from 60 to 65 dBA CNEL, the inclusion of adequate forced-air mechanical ventilation is often the method selected to reduce interior noise levels to acceptable levels by closing the windows to control noise. Where noise levels exceed 65 dBA CNEL, forced-

air mechanical ventilation systems and sound-rated construction methods are normally required. Such methods or materials may include a combination of smaller window and door sizes as a percentage of the total building façade facing the noise source, sound-rated windows and doors, sound rated exterior wall assemblies, and mechanical ventilation so windows may be kept closed at the occupant's discretion.

Residential units located on the south side of the building, facing Pruneridge Avenue, would be exposed to future exterior noise levels up to 66 dBA CNEL, while residential units located on the west side of the building, facing San Tomas Expressway, would be exposed to future exterior noise levels ranging up to 74 dBA CNEL. Assuming windows to be partially open, future interior noise levels in these units would be up to 51 dBA CNEL in the units facing Pruneridge Avenue and up to 59 dBA CNEL in the units facing San Tomas Expressway.

The north façade of the building will be exposed to future exterior noise levels ranging from 57 to 71 dBA CNEL, closer to San Tomas Expressway. The east façade of the building, near the public park, will be exposed to future exterior noise levels ranging from 58 to 61 dBA CNEL, closer to Pruneridge Avenue. Assuming windows to be partially open, future interior noise levels in these units would range from 42 to 56 dBA CNEL inside units on the north side of the building, and from 43 to 46 dBA CNEL inside units on the east side of the building. All other residential units would be exposed to noise levels of 55 dBA CNEL or less and would have interior noise levels of 45 dBA CNEL or less with windows partially open.

To meet the interior noise requirements set forth by the State of California of 45 dBA CNEL, implementation of noise insulation features would be required.

Noise Insulation Features to Reduce Future Interior Noise Levels

The following noise insulation features shall be incorporated into the proposed project to reduce interior noise levels to 45 dBA CNEL or less at residential interiors:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, for all residential units on the project site, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- Residential units along the western façade of the building, facing San Tomas Expressway, would require windows and doors with a minimum rating of 33 to 35 STC.

- Residential units along the northern building façade, nearest to San Tomas Expressway, would require windows and doors with a minimum rating of 29 to 30.

The implementation of these noise insulation features would reduce interior noise levels to 45 dBA CNEL or less at residential uses. Standard construction materials, with adequate forced-air mechanical ventilation, would be sufficient for all other residential units.

Interior Noise Standard for Residential Development. The project applicant shall prepare final design plans that incorporate building design and acoustical treatments to ensure compliance with State Building Codes and City noise standards. A project-specific acoustical analysis shall be prepared to ensure that the design incorporates controls to reduce interior noise levels to 45 dBA CNEL or lower within the residential units. The project applicant shall conform with any special building construction techniques requested by the City's Building Department, which may include sound-rated windows and doors, sound-rated wall constructions, and acoustical caulking.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

The following criteria were used to evaluate the significance of environmental noise resulting from the project:

(a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;

(b) Generation of excessive groundborne vibration or groundborne noise levels; or

(c) For a project located within the vicinity of a private airstrip or an airport land use plan or where such a plan has not been adopted within two miles of a public airport or public use airport, if the project would expose people residing or working in the project area to excessive noise levels.

Impact 1a: **Temporary Construction Noise.** Existing noise-sensitive land uses would be exposed to a temporary increase in ambient noise levels due to project construction activities. The incorporation of construction best management practices would ensure a **less-than-significant** temporary noise impact.

The construction schedule assumed that the earliest possible start date would be the beginning of January 2027, and the project is expected to be completed in the beginning of February 2029. Construction phases would include demolition, site preparation, grading, trenching, building construction, architectural coating, and paving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g.,

early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

The City's Municipal Code limits construction activities (including the loading and unloading of materials and truck movements) within 300 feet of residentially zoned property to the hours of 7:00 a.m. to 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

While noise thresholds for temporary construction are not provided in the City's General Plan or Municipal Code, this analysis uses the noise limits established by the Federal Transit Administration (FTA) to identify the potential for impacts due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*.[1] During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be applied at residential land uses, 85 dBA L_{eq} shall be applied at commercial land uses, and 90 dBA L_{eq} shall be applied at industrial land uses.

Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The typical range of maximum instantaneous noise levels for the proposed project would be 70 to 90 dBA L_{max} at a distance of 50 feet (see Table 5). Table 6 shows typical hourly average construction-generated noise levels measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). As shown in Table 6, typical residential buildings generate construction noise levels ranging from 72 to 88 dBA L_{eq} at a distance of 50 feet from the center of the active site. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor. Shielding by buildings or terrain often result in lower construction noise levels at distant receptors; however, for purposes of assessing a worst-case scenario, construction noise levels in this report are estimated assuming no attenuation due to intervening buildings or structures.

Equipment expected to be used in each construction stage are summarized in Tables 7 though 9, along with the quantity of each type of equipment and the reference noise level at 50 feet, assuming the operation of the two loudest pieces of construction equipment for each construction phase.

Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels for each phase of construction, assuming the two loudest pieces of equipment would operate simultaneously, as recommended by the FTA for construction noise evaluations. This construction noise model includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating

TABLE 5 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L_{max} Level (dBA)[1,2]	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor[3]	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes: [1] Measured at 50 feet from the construction equipment, with a "slow" (1 sec.) time constant.

[2] Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

[3]Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

TABLE 6 Typical Ranges of Construction Noise Levels at 50 Feet, L_{eq} (dBA)

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I – All pertinent equipment present at site.
II – Minimum required equipment present at site.

Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1, p. 2-104, 1973.

TABLE 7 Estimated Construction Noise Levels for the Apartment Buildings at 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	20 days	Concrete/Industrial Saw (1)[a] Excavator (1)[a] Tractor/Loader/Backhoe (3)	84 dBA L_{eq}
Site Preparation	15 days	Tractor/Loader/Backhoe (2)[a]	77 dBA L_{eq}
Grading/Excavation	50 days	Excavator (1) Grader (1)[a] Concrete/Industrial Saw (1)[a] Tractor/Loader/Backhoe (3)	85 dBA L_{eq}
Trenching/Foundations	100 days	Tractor/Loader/Backhoe (1)[a] Excavator (1)[a]	78 dBA L_{eq}
Building – Exterior	320 days	Crane (2) Forklift (2) Generator Set (4)[a] Tractor/Loader/Backhoe (4) Welder (3) Cement Mixer (2)	81 dBA L_{eq}
Building – Interior/ Architectural Coating	320 days	Air Compressor (10)[a] Aerial Lift (8)	77 dBA L_{eq}
Paving	10 days	Paver (1)[a] Paving Equipment (1)[a] Roller (1) Tractor/Loader/Backhoe (1)	77 dBA L_{eq}

[a] Denotes two loudest pieces of construction equipment per phase.

TABLE 8 Estimated Construction Noise Levels for the Golf Course at 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	45 days	Concrete/Industrial Saw (1)[a] Rubber-Tired Dozer (1)[a] Tractor/Loader/Backhoe (3)	84 dBA L_{eq}
Site Preparation	15 days	Tractor/Loader/Backhoe (2)[a]	77 dBA L_{eq}
Grading/Excavation	45 days	Grader (1)[a] Tractor/Loader/Backhoe (3)[a]	82 dBA L_{eq}

[a] Denotes two loudest pieces of construction equipment per phase.

TABLE 9 Estimated Construction Noise Levels for the Public Park at 50 feet

Phase of Construction	Total Workdays	Construction Equipment (Quantity)	Estimated Construction Noise Level at 50 feet
Demolition	45 days	Concrete/Industrial Saw (1)[a] Rubber-Tired Dozer (1)[a] Tractor/Loader/Backhoe (3)	84 dBA L_{eq}
Site Preparation	15 days	Grader (1)[a] Rubber-Tired Dozer (1)[a] Tractor/Loader/Backhoe (2)	83 dBA L_{eq}
Grading/Excavation	45 days	Grader (1)[a] Rubber-Tired Dozer (1)[a] Tractor/Loader/Backhoe (3)	83 dBA L_{eq}

[a] Denotes two loudest pieces of construction equipment per phase.

at full power. Tables 10 through 12 summarize the construction noise levels for the two loudest pieces of equipment propagated to the surrounding receiving land uses.

To assess construction noise impacts at the receiving property lines of existing noise-sensitive receptors, the worst-case hourly average noise level, which would result in the noise levels summarized in Tables 7 through 9, were propagated from the center of each active construction area to the nearest property lines of the surrounding land uses. These noise level estimates are shown in Tables 10 through 12. Noise levels in these Tables do not assume reductions due to intervening buildings or existing barriers.

As shown in Tables 10 through Table 12, construction noise levels would intermittently range from 51 to 78 dBA L_{eq} at nearby residential land uses and from 56 to 72 dBA L_{eq} at nearby commercial land uses when activities are focused near the center of construction activities. These construction noise levels would not exceed the exterior threshold of 80 dBA L_{eq} at residential land uses, or the 85 dBA L_{eq} threshold for commercial land uses near the site. A worst-case scenario would occur if the center of construction activities was on a property line. Even in this scenario, construction noise levels would not exceed the thresholds at the nearest residential and commercial land uses. This would be a less-than-significant impact.

Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction material, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. The construction crew shall adhere to the following construction best management practices to reduce construction noise levels emanating from the site and minimize disruption and annoyance at existing noise-sensitive receptors in the project vicinity. The incorporation of construction best management practices as project conditions of approval would assist in assuring that construction noise would result in a less-than-significant temporary noise impact.

TABLE 10 Estimated Construction Noise Levels from the Apartment Building at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	South Commercial (220 ft)	West Residential (280 ft)	North Residential (315 ft)	East Residential (955 ft)
Demolition	71 dBA L_{eq}	69 dBA L_{eq}	68 dBA L_{eq}	58 dBA L_{eq}
Site Preparation	64 dBA L_{eq}	62 dBA L_{eq}	61 dBA L_{eq}	51 dBA L_{eq}
Grading/Excavation	72 dBA L_{eq}	70 dBA L_{eq}	69 dBA L_{eq}	59 dBA L_{eq}
Trenching/Foundations	66 dBA L_{eq}	64 dBA L_{eq}	63 dBA L_{eq}	53 dBA L_{eq}
Building – Exterior	68 dBA L_{eq}	66 dBA L_{eq}	65 dBA L_{eq}	55 dBA L_{eq}
Building – Interior/ Architectural Coating	64 dBA L_{eq}	62 dBA L_{eq}	61 dBA L_{eq}	51 dBA L_{eq}
Paving	64 dBA L_{eq}	62 dBA L_{eq}	61 dBA L_{eq}	52 dBA L_{eq}

TABLE 11 Estimated Construction Noise Levels from the Golf Course at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	South Commercial (550 ft)	West Residential (250 ft)	North Residential (100 ft)	East Residential (500 ft)
Demolition	63 dBA L_{eq}	70 dBA L_{eq}	78 dBA L_{eq}	64 dBA L_{eq}
Site Preparation	56 dBA L_{eq}	63 dBA L_{eq}	71 dBA L_{eq}	57 dBA L_{eq}
Grading/Excavation	61 dBA L_{eq}	68 dBA L_{eq}	76 dBA L_{eq}	62 dBA L_{eq}

TABLE 12 Estimated Construction Noise Levels from the Public Park at Nearby Land Uses

Phase of Construction	Calculated Hourly Average Noise Levels, L_{eq} (dBA)			
	South Commercial (190 ft)	West Residential (890 ft)	North Residential (570 ft)	East Residential (475 ft)
Demolition	72 dBA L_{eq}	59 dBA L_{eq}	63 dBA L_{eq}	64 dBA L_{eq}
Site Preparation	71 dBA L_{eq}	58 dBA L_{eq}	62 dBA L_{eq}	63 dBA L_{eq}
Grading/Excavation	71 dBA L_{eq}	58 dBA L_{eq}	62 dBA L_{eq}	53 dBA L_{eq}

Construction Best Management Practices

Develop a construction noise control plan, including, but not limited to, the following available controls:

- Ensure that excavating, grading and filling activities, and other construction activities (including the loading and unloading of materials and truck movements) within 300 feet of residentially zoned property, including hotel properties, are limited to the hours of 7:00 a.m. to 6:00 p.m. on weekdays and between the hours of 9:00 a.m. and 6:00 p.m. on Saturdays. No construction is permitted on Sundays or holidays.

- Construct temporary noise barriers, where feasible, to screen stationary noise-generating equipment located on the perimeter of the site in the direct view of sensitive receptors. Temporary noise barrier fences would provide a 5 dBA noise reduction if the noise barrier interrupts the line-of-sight between the noise source and receptor and if the barrier is constructed in a manner that eliminates any cracks or gaps.

- Equip all internal combustion engine-driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.

- Unnecessary idling of internal combustion engines should be strictly prohibited.

- Locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as possible from sensitive receptors as feasible. If they must be located near receptors, adequate muffling (with enclosures where feasible and appropriate) shall be used to reduce noise levels at the adjacent sensitive receptors. Any enclosure openings or venting shall face away from sensitive receptors.

- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors near the project site during all project construction.

- Locate material stockpiles, as well as maintenance/equipment staging and parking areas, as far as feasible from residential receptors.

- Route construction-related traffic along major roadways and as far as feasible from sensitive receptors.

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.

- The contractor shall provide a detailed construction schedule to inform adjacent sensitive receptors of major noise-generating construction activities.

- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause

of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include in it the notice sent to neighbors regarding the construction schedule.

Implementation of the above measures would reduce construction noise levels emanating from the site, limit construction hours, and minimize disruption and annoyance. With the implementation of these measures and recognizing that noise generated by construction activities would occur over a temporary period, the temporary increase in ambient noise levels would result in a less-than-significant impact.

Mitigation Measure 1a: None required.

Impact 1b: Permanent Noise Level Increase/Exceed Applicable Standards. The proposed project would not result in a substantial permanent noise level increase at receptors in the project vicinity. This is a **less-than-significant** impact.

Project Traffic Increase

A significant impact would occur if the permanent noise level increase due to project-generated traffic was 3 dBA CNEL or greater for future ambient noise levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future ambient noise levels at or below 60 dBA CNEL. Existing ambient measurements made in the project site vicinity indicate that existing and future ambient noise levels at the noise-sensitive receptors that are along the major roadways near the site are, and will be over 60 dBA CNEL. Therefore, a significant impact would occur if project-generated traffic increased levels by 3 dBA CNEL or more at these receptors. Existing and future ambient noise levels at the residences to the north are, and will be under 60 dBA CNEL. A significant impact would occur if project-generated traffic increased levels by 5 dBA CNEL or more at these receptors. Project-generated traffic is expected to increase the ambient noise levels in the project vicinity by less than 1 dBA CNEL. This impact is a less-than-significant impact.

Mechanical Equipment

Under the City of Santa Clara Municipal Code, noise generated by fixed sources of noise would be restricted to 55 dBA during daytime hours (7:00 a.m. to 10:00 p.m.) and to 50 dBA during nighttime hours (10:00 p.m. to 7:00 a.m.) at residentially zoned land uses. At existing commercial land uses, noise would be restricted to 65 dBA during daytime hours and to 60 dBA during nighttime hours.

The site plan for the proposed building shows heating, ventilation, and air conditioning (HVAC) units on the roof level of the building. Parapets are planned for the roof, which will shield some of the noise from these units. Typical noise levels produced by residential HVAC units would range from 53 to 63 dBA at 3 feet during operation. These types of units typically cycle on and off continuously during daytime and nighttime hours. Since the units would be clustered at different parts of the rooftops, the most combined HVAC noise would be from up to five units clustered together. Assuming up to five units would operate simultaneously at any given time, the estimated

combined noise level at 3 feet would be up to 70 dBA. Because the HVAC units will be on the rooftops of the buildings, unit noise at nearby receptors will be reduced because of the shielding provided by the parapets and the buildings themselves. Given these factors, HVAC noise would be well below the ambient noise levels in the area, and not audible at any property lines near the project site.

Based on the estimated noise levels, mechanical equipment noise levels are not expected to exceed the City's daytime or nighttime thresholds at residential and commercial uses surrounding the site. For all existing receptors in the project vicinity, the noise level increase due to mechanical equipment noise would not be measurable or detectable (0 dBA CNEL increase).

Maintenance Shop and Yard

The site plan shows that a maintenance shop and yard will be located near the east side of the building, near the public park. Noises related to such a yard could include small trucks, forklifts and maintenance vehicles. The loudest type of potential equipment associated with the yard would be a forklift, although forklifts are not normally used constantly throughout the day. Typical hourly noise levels produced by a forklift at 50-feet are approximately 68 dBA L_{eq}. The center of the yard will be located approximately 220 feet from the nearest commercial property line and approximately 465 feet from the nearest residential property line. The yard will be enclosed with a 6-foot-tall wall. Given these factors, forklift noise and other equipment noise would be well below the ambient noise levels in the area, and not audible at any property lines near the project site.

Total Combined Project-Generated Noise

The operational noise levels produced by the proposed project combined (i.e., traffic and mechanical equipment) would not result in a measurable or detectable noise level increase (0 dBA CNEL). Further, operational noise levels due to mechanical equipment would not exceed the City's daytime or nighttime thresholds at receptors surrounding the project site. This would be a less-than-significant impact.

Mitigation Measure 1b: None required.

Impact 2: Exposure to Excessive Groundborne Vibration due to Construction. Construction-related vibration levels resulting from activities at the project site would not exceed 0.3 in/sec PPV at the existing structures in the vicinity of the project site. **This is a less-than-significant impact.**

The construction of the project may generate vibration when heavy equipment or impact tools (e.g., jackhammers, hoe rams) are used. Construction activities would include grading, foundation work, paving, and new building framing and finishing. According to the equipment list provided at the time of this study, impact or vibratory pile driving activities, which can cause excessive vibration, are not expected for the proposed project.

For structural damage, the California Department of Transportation recommends a vibration limit of 0.5 in/sec PPV for buildings structurally sound and designed to modern engineering standards, 0.3 in/sec PPV for buildings that are found to be structurally sound but where structural damage is a major concern, and a conservative limit of 0.25 in/sec PPV for some historic buildings. No known historic buildings adjoin the project area, therefore, groundborne vibration levels exceeding 0.3 in/sec PPV would have the potential to result in a significant vibration impact.

Table 13 presents typical vibration levels that could be expected from construction equipment, as measured at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet. Vibration levels would vary depending on soil conditions, construction methods, and equipment used.

TABLE 13 Vibration Source Levels for Construction Equipment

Equipment		PPV at 25 ft. (in/sec)	Estimated Vibration Levels at Structures Surrounding the Project Site, in/sec PPV			
			South Commercial (120 feet)	West Residential (170 feet)	North Residential (165 feet)	East Residential (205 feet)
Clam shovel drop		0.202	0.036	0.025	0.025	0.020
Hydromill (slurry wall)	in soil	0.001	0.001	0.001	0.001	0.001
	in rock	0.003	0.002	0.002	0.002	0.002
Vibratory Roller		0.210	0.037	0.025	0.026	0.021
Hoe Ram		0.089	0.016	0.011	0.011	0.009
Large bulldozer		0.089	0.016	0.011	0.011	0.009
Caisson drilling		0.089	0.016	0.011	0.011	0.009
Loaded trucks		0.076	0.014	0.009	0.010	0.008
Jackhammer		0.035	0.006	0.004	0.004	0.003
Small bulldozer		0.003	0.001	0.000	0.000	0.000

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, September 2018, as modified by Illingworth & Rodkin, Inc., June 2025.

Table 13 also summarizes the estimated vibration levels at the nearest existing buildings surrounding the project site. Construction vibration levels would depend on the specific location of individual pieces of equipment. That is, equipment scattered throughout the site would not generate a collective vibration level, but a vibratory roller, for instance, operating near the project site boundary would generate the worst-case vibration levels for the receptor nearest to that property line. Further, construction vibration impacts are assessed based on the potential for damage to buildings on receiving land uses, not at receptors at the nearest property lines. Therefore, the distances used to propagate construction vibration levels (as shown in Table 13), which are different than the distances used to propagate construction noise levels (as shown in Tables 10 through 12), were estimated under the assumption that each piece of equipment was operating along the nearest boundary of the project site, which would represent the worst-case scenario. As shown in Table 13, vibration levels would not exceed 0.3 in/sec PPV at any buildings near the project site.

A study completed by the US Bureau of Mines analyzed the effects of blast-induced vibration on buildings in USBM RI 8507.[2] The findings of this study have been applied to buildings affected by construction-generated vibrations.[3] As reported in USBM RI 8507[2] and reproduced by Dowding,[3] Figure 2 presents the damage probability, in terms of "threshold damage," "minor damage," and "major damage," at varying vibration levels. Threshold damage, which is described as cosmetic damage in this report, would entail hairline cracking in plaster, the opening of old cracks, the loosening of paint or the dislodging of loose objects. Minor damage would include hairline cracking in masonry or the loosening of plaster, and major structural damage would include wide cracking or shifting of foundation or bearing walls.

As shown in Figure 2, maximum vibration levels of 0.037 in/sec PPV would result in a 0% chance of cosmetic damage. Likewise, no minor or major damage would be expected at the buildings nearest to the project site.

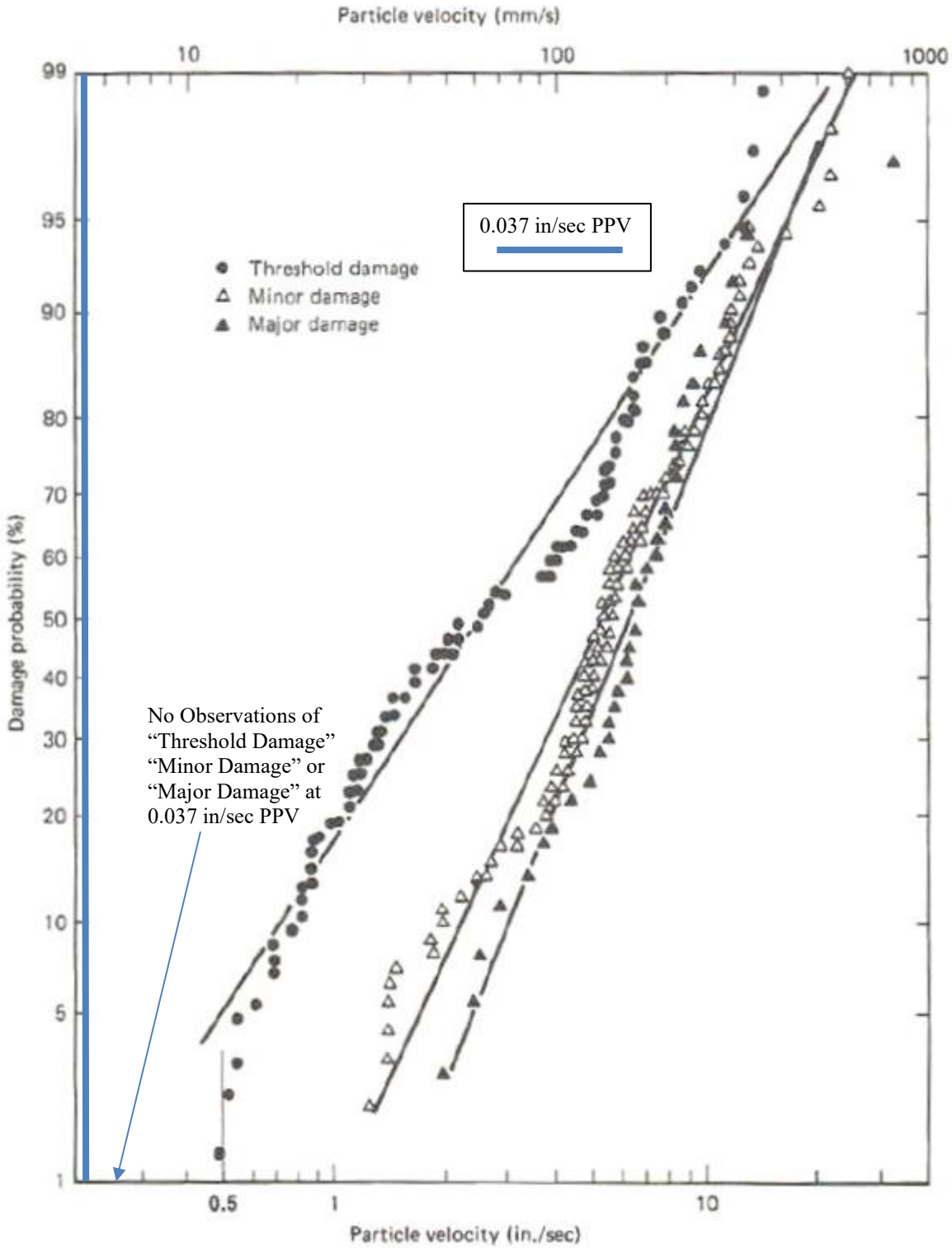
Although cosmetic, minor, or major damage would not occur at nearby conventional buildings, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration (use of jackhammers and other high-power tools). By use of administrative controls, such as notifying neighbors of scheduled construction activities and scheduling construction activities with the highest potential to produce perceptible vibration during hours with the least potential to affect nearby businesses, perceptible vibration can be kept to a minimum.

In summary, the construction of the project would not exceed the State's threshold of 0.3 in/sec PPV at any buildings near the project site. This would be a less-than-significant impact.

Mitigation Measure 2: None required.

[2] Siskind, D.E., M.S. Stagg, J.W. Kopp, and C.H. Dowding, Structure Response and Damage Produced by Ground Vibration form Surface Mine Blasting, RI 8507, Bureau of Mines Report of Investigations, U.S. Department of the Interior Bureau of Mines, Washington, D.C., 1980.
[3] Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996.

FIGURE 2 Probability of Cracking and Fatigue from Repetitive Loading



Source: Dowding, C.H., Construction Vibrations, Prentice Hall, Upper Saddle River, 1996, as modified by Illingworth & Rodkin, Inc., June 2025.

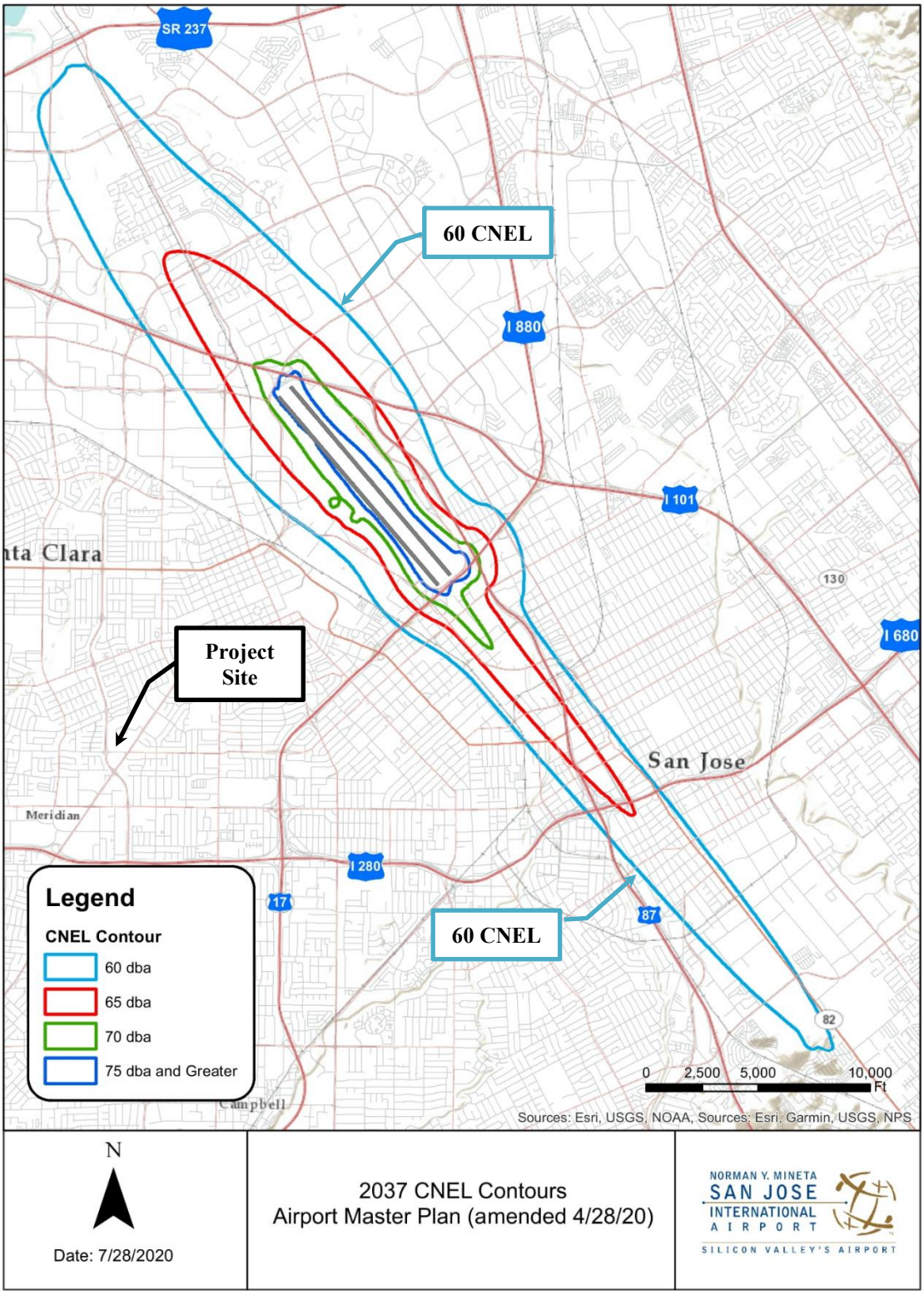
Impact 3: **Excessive Aircraft Noise.** The project site is located more than two miles from a public airport or public use airport, and the proposed project would not expose people residing or working in the area to excessive aircraft noise levels. **This is a less-than-significant impact.**

San José Mineta International Airport is a public-use airport located approximately 2.75 miles northeast of the project site. According to the new Airport Master Plan Environmental Impact Report,[4] the project site lies well outside the 60 dBA CNEL contour line (see Figure 3). Aircraft noise would result in exterior noise levels below the City's requirements for residential land uses. Therefore, the proposed project would be compatible with the City's exterior noise standards for aircraft noise.

Mitigation Measure 3: **None required.**

[4] David J. Powers & Associates, Inc., Integrated Final Environmental Impact Report, Amendment to Norman Y. Mineta San Jose International Airport Master Plan, April 2020.

FIGURE 3 2037 CNEL Noise Contours for SJIA Relative to Project Site



Source: https://www.flysanjose.com/sites/default/files/noise/2037_CNEL.pdf

Cumulative Impacts

Cumulative noise impacts would include either cumulative traffic noise increases under future conditions or temporary construction noise from cumulative construction projects.

A significant cumulative traffic noise increase would occur if two criteria are met: 1) if the cumulative traffic noise level increase was 3 dBA CNEL or greater for future levels exceeding 60 dBA CNEL or was 5 dBA CNEL or greater for future levels at or below 60 dBA CNEL; and 2) if the project would make a "cumulatively considerable" contribution to the overall traffic noise increase. A "cumulatively considerable" contribution would be defined as an increase of 1 dBA CNEL or more attributable solely to the proposed project.

The project would not be expected to result in a cumulatively considerable contribution along any roadway segments with noise-sensitive receptors. Therefore, the project would not result in a cumulative noise increase due to traffic.

From the City's website,[5] there are no other planned or approved projects located within 1,000 feet of the proposed project. Therefore, the noise-sensitive receptors surrounding the project site would not be subject to cumulative construction impacts.

[5] https://missioncity.maps.arcgis.com/apps/MapTour/index.html?appid=5afdbed13fad458cb6288c46a0bad060

APPENDIX A

FIGURE A1

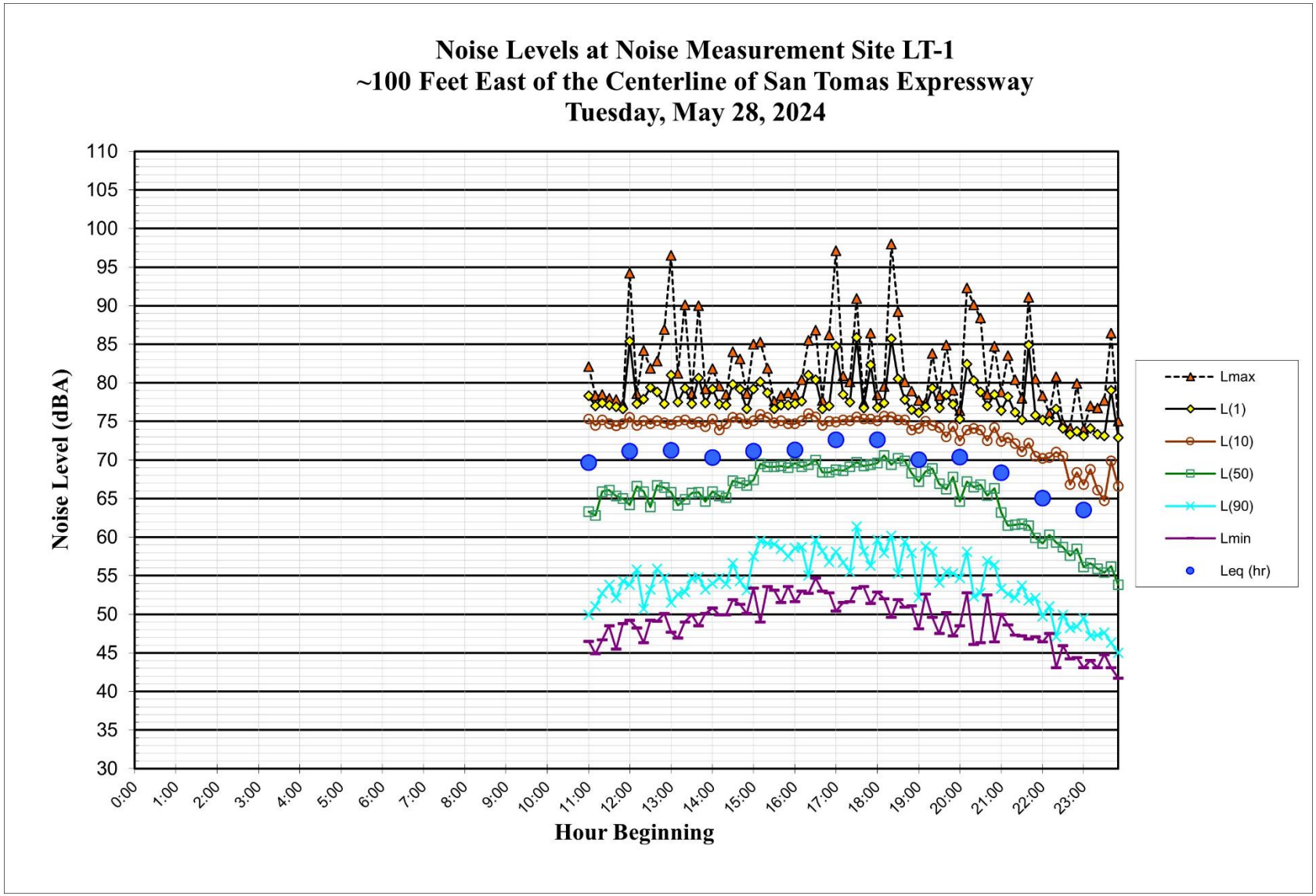


FIGURE A2

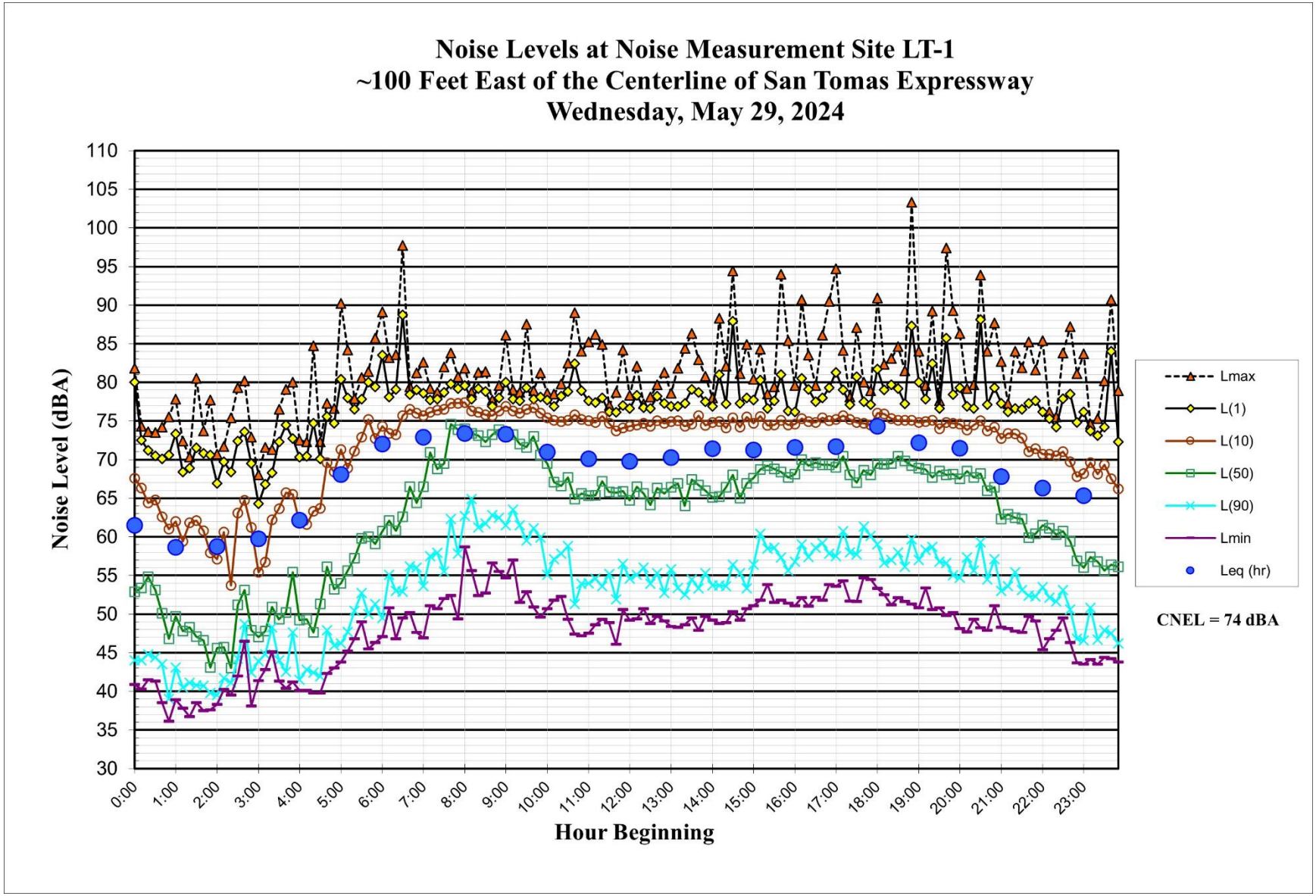

Noise Levels at Noise Measurement Site LT-1
~100 Feet East of the Centerline of San Tomas Expressway
Wednesday, May 29, 2024
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
CNEL = 74 dBA

FIGURE A3

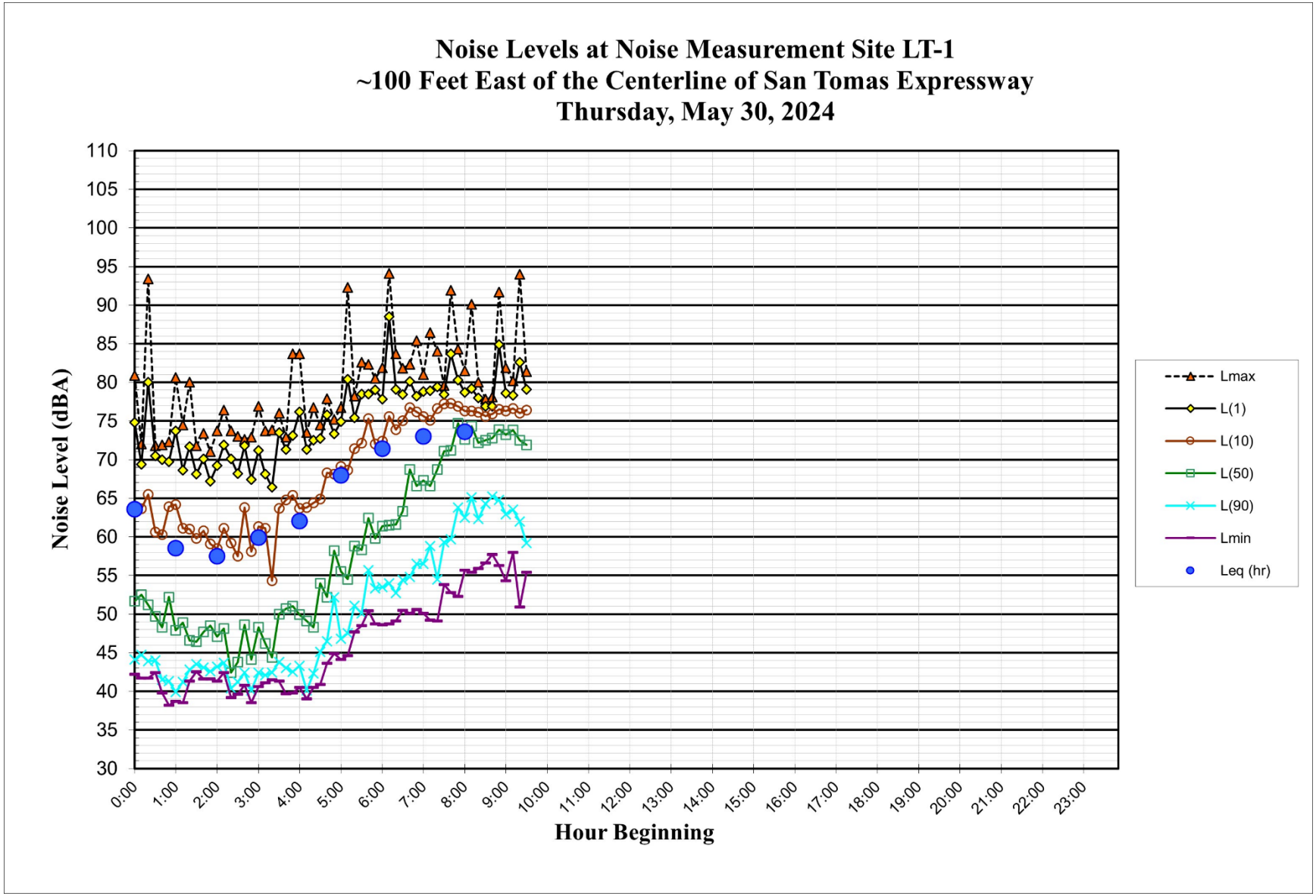

Noise Levels at Noise Measurement Site LT-1
~100 Feet East of the Centerline of San Tomas Expressway
Thursday, May 30, 2024
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

FIGURE A4

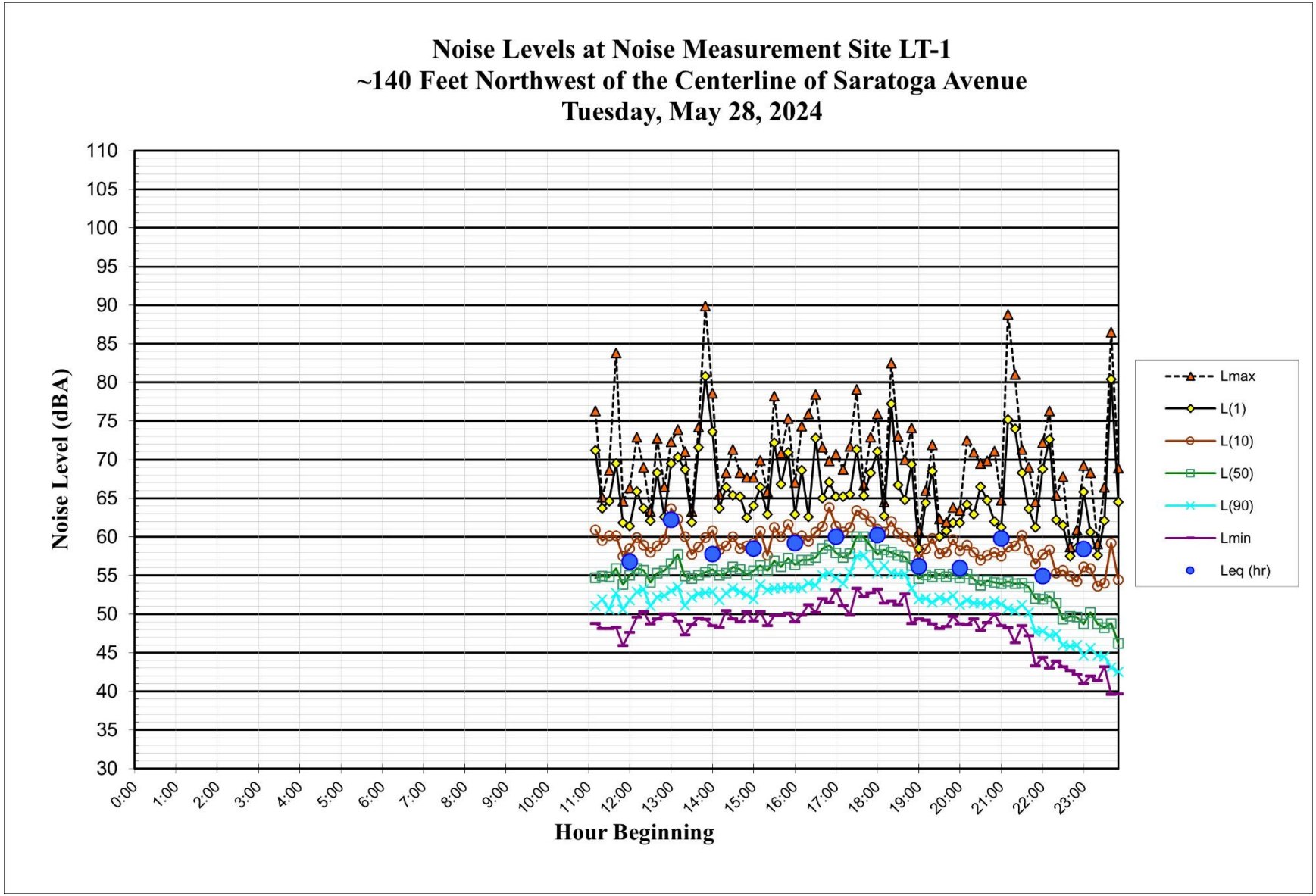

Noise Levels at Noise Measurement Site LT-1
~140 Feet Northwest of the Centerline of Saratoga Avenue
Tuesday, May 28, 2024
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)

FIGURE A5

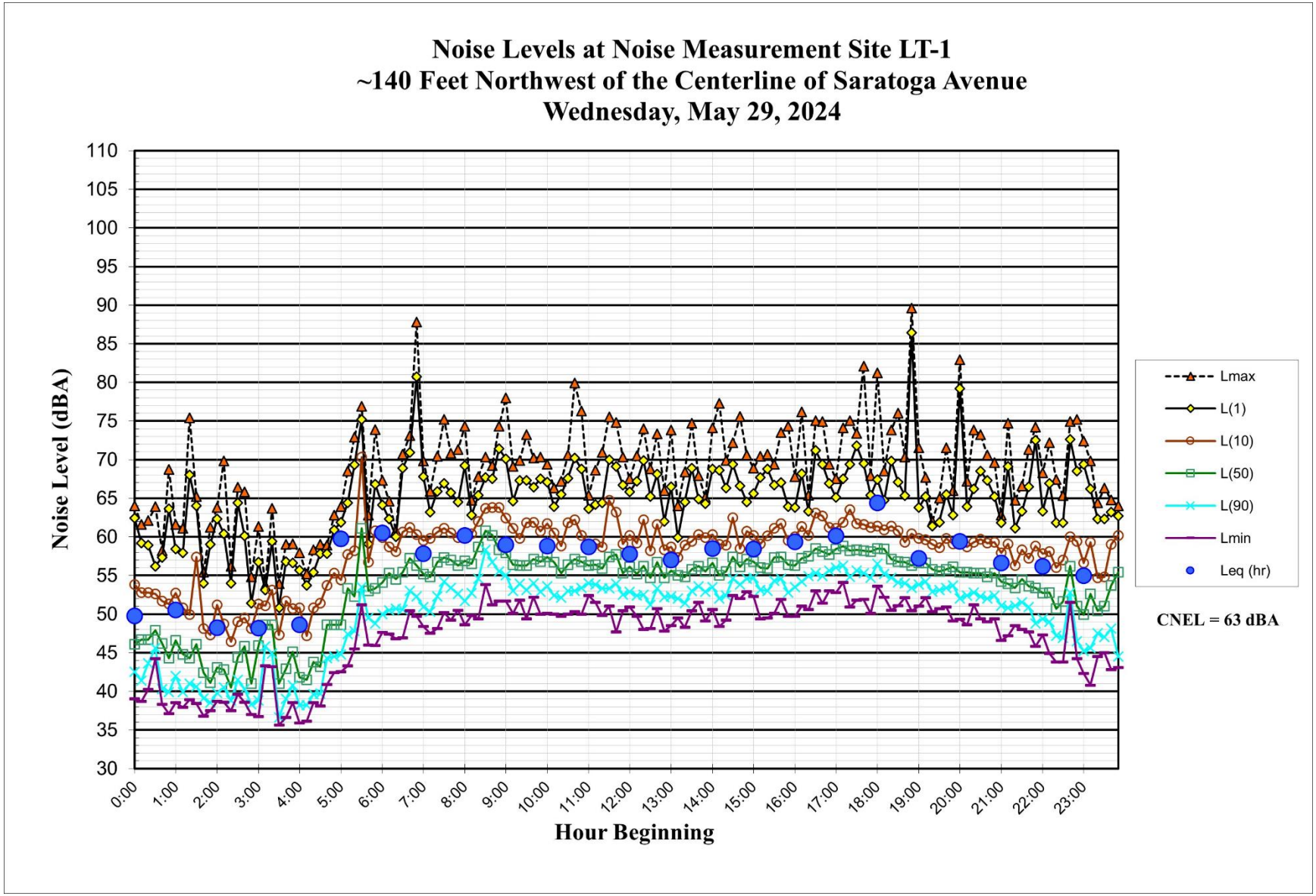
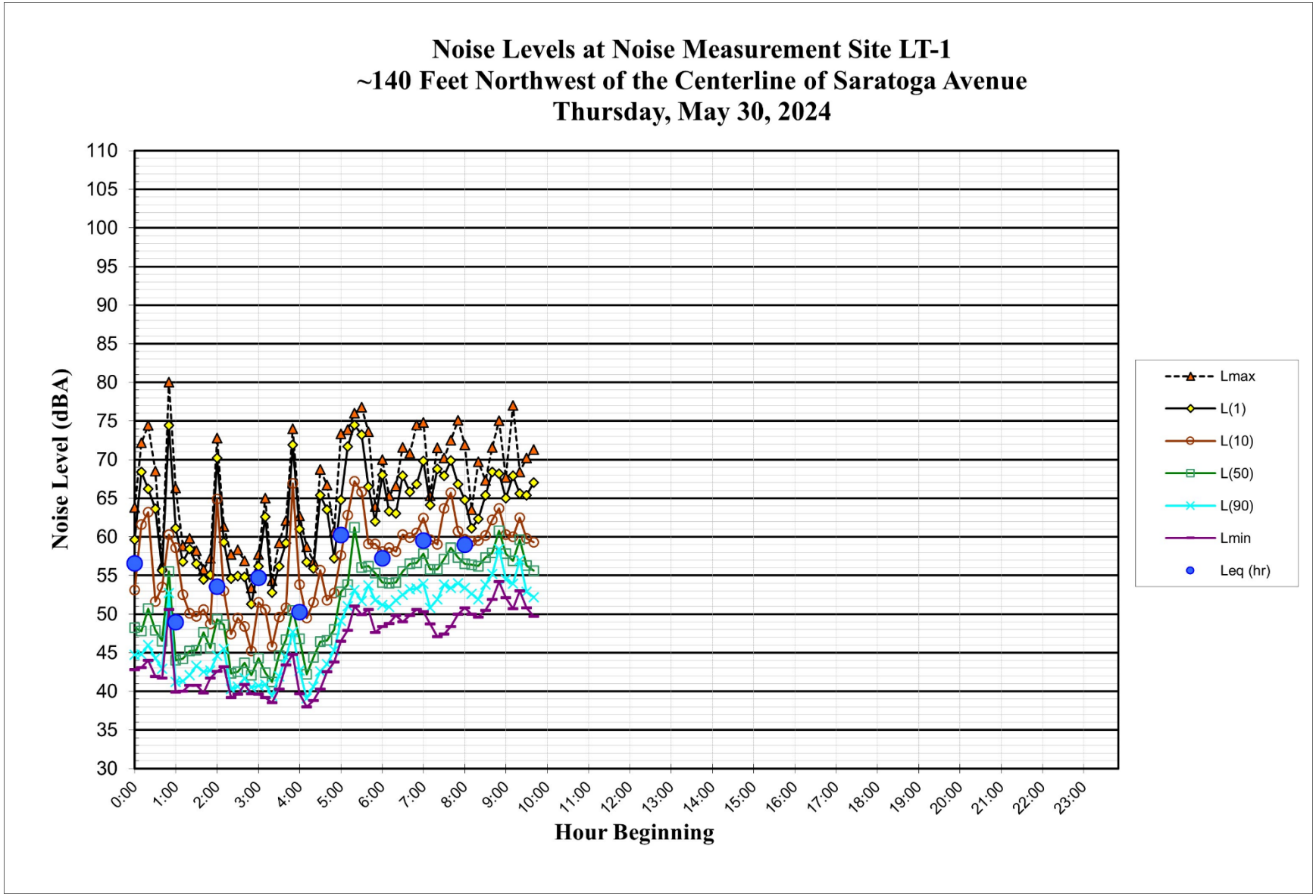

Noise Levels at Noise Measurement Site LT-1
~140 Feet Northwest of the Centerline of Saratoga Avenue
Wednesday, May 29, 2024
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)
CNEL = 63 dBA

FIGURE A6


Noise Levels at Noise Measurement Site LT-1
~140 Feet Northwest of the Centerline of Saratoga Avenue
Thursday, May 30, 2024
Noise Level (dBA)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Hour Beginning
Lmax
L(1)
L(10)
L(50)
L(90)
Lmin
Leq (hr)